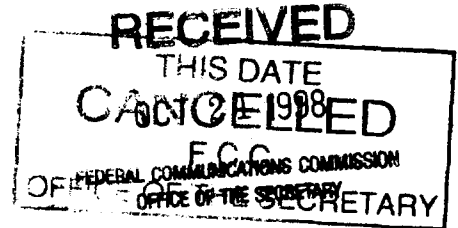


October 21, 1998

EX PARTE OR LATE FILED

RECEIVED

OCT 20 1998

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, DC 20554

Re: Advanced Television Systems And Their Impact Upon The Existing Television
Broadcast Service, MM Docket No. 87-268



Dear Ms. Salas:

Pursuant to Section 1.200, et seq., of the Commission's Rules, National Public Radio, Inc. ("NPR") hereby notifies the Commission that NPR made the following written *ex parte* presentation regarding the above-referenced proceeding.



On October 20, 1998, NPR delivered to the Chairman, the Commissioners, and Bruce A. Franca, Deputy Chief, Office of Engineering and Technology, a letter and Final Report entitled "DTV Channel 6 Interference to FM Band Reception," two (2) copies of which are enclosed herewith.



Please direct any questions you may have regarding this matter to the undersigned.

Sincerely,

Gregory A. Lewis
Associate General Counsel

cc: Honorable William E. Kennard (w/o enclosure)
Honorable Susan Ness (w/o enclosure)
Honorable Harold Furchtgott-Roth (w/o enclosure)
Honorable Michael Powell (w/o enclosure)
Honorable Gloria Tristani (w/o enclosure)
Bruce A. Franca (w/o enclosure)
Deputy Chief, Office of Engineering and Technology

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OCT 20 1998

FEDERAL BUREAU OF INVESTIGATION
DEPARTMENT OF JUSTICE

Ex Parte Presentation

October 20, 1998

UNCLASSIFIED

Honorable William E. Kennard
Honorable Susan Ness
Honorable Harold Furchtgott-Roth
Honorable Michael Powell
Honorable Gloria Tristani
Chairman, Federal Communications Commission
1919 M Street, NW
Washington, DC 20554



Re: Advanced Television Systems And Their Impact Upon The Existing Television Broadcast Service, MM Docket No. 87-268

Dear Chairman and Commissioners:



I am enclosing a copy of the Final Report entitled "DTV Channel 6 Interference to FM Band Reception" which examined the potential for interference from DTV channel 6 stations to reserved channel FM stations under a variety of real world conditions. The Final Report concludes that significant interference to FM reception will occur in DTV channel 6 markets unless appropriate measures are taken to protect affected FM stations.



As NPR previously explained in an ex parte communication of January 16 of this year, we initiated the laboratory testing because of the long history of adjacent channel interference involving analog television channel 6 stations and because the laboratory and field testing conducted pursuant to the advanced television proceeding had not specifically examined the potential interference of DTV channel 6 stations to reserved channel FM stations. The laboratory testing was conducted at the NASA Lewis Research Center in Cleveland, OH with the assistance of the Consumer Electronics Manufacturers' Association. The National Telecommunications Information Administration (NTIA) of the Department of Commerce provided the principal funding for this project through its Public Telecommunications Facilities Program (PTFP).

As you know, since we initiated the laboratory testing, the Commission has acknowledged the potential for interference from DTV channel 6 stations to reserved channel FM stations in its Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order in the advanced television proceeding. The Commission ruled that "as a general matter and consistent with our longstanding policy regarding new stations, it will be the initial responsibility of a DTV licensee to protect against or eliminate harmful interference to any FM radio stations that are in operation at the time the DTV station commences operation."

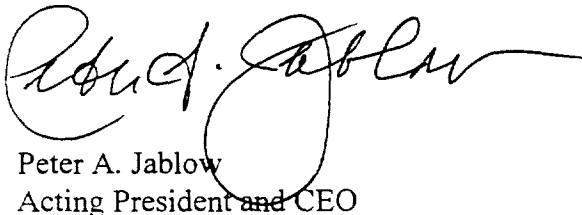
Advanced Television Systems, Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order, MM Docket No. 87-268, at ¶ 45 (rel. Feb. 23, 1998).

Furthermore, the Commission required proposed new DTV channel 6 stations to establish that interference to reserved channel FM stations will not occur.

In this matter, as in so many others, we appreciate the Commission's concern for and efforts to protect public radio stations and the service they provide to the American people. Based on the results of the recently completed laboratory testing, it is now clear that the Commission's ongoing support will be necessary during and after the DTV transition to avoid harmful interference to individual public radio stations and the degradation of public radio service as a whole.

In closing, I or the staff at NPR would be happy to discuss this important matter in greater detail. Please feel free to contact me or Donald Lockett, NPR's Chief Technology Officer, at (202) 414-2486.

Sincerely,



Peter A. Jablow
Acting President and CEO

Enclosure

cc: Bruce A. Franca,
Deputy Chief, Office of Engineering and Technology
Federal Communications Commission

**DTV Channel 6 Interference
to FM Band Reception**

Final Report

July 24, 1998

**Published by:
National Public Radio**

**Funded by:
The Department of Commerce National Telecommunications &
Information Administration pursuant to the Public
Telecommunications Facilities Program**

Executive Summary

National Public Radio (NPR) commissioned this study to consider the interference potential of digitally modulated television (DTV) stations assigned to DTV Channel 6 on existing public radio stations operating in the lower noncommercial FM band, Channels 201-220 (88.1-91.9 MHz). While there was considerable historical interference between NTSC television stations assigned to Channel 6 and FM stations in the noncommercial FM band, there had not been a detailed consideration of this issue during the laboratory and field testing of DTV systems.

Presumably, digital transmission implies a certain immunity from interference, suggesting that the DTV signal might be less prone to interfere with or receive interference from low band FM. However, absent the availability of DTV receivers, the effect of low band FM signals on DTV Channel 6 stations was not included in the scope of this study.

The mask of a DTV signal is just like the mask of random noise filtered by a bandpass filter to 6 MHz of bandwidth. That is, DTV looks like noise on a spectrum analyzer, and that is what it looks like to a DTV receiver before demodulation. In conducting this study, NPR was concerned with how the noise presented by the density of the DTV mask might alter the FM interference experienced with NTSC television in the past.

The study is therefore limited to laboratory measurements, observations and calculated predictions of the real world interference. Computer modeling techniques were applied using the laboratory data to one NTSC TV channel 6 market (its DTV Channel 64 allotment is outside the established "core channel" region) and one DTV Channel 6 allotted market. The markets selected for analysis were Philadelphia, PA, and New Haven, CT.

The realities of DTV interference became evident on February 27, 1998, when low power biomedical telemetry devices using VHF television channel 9 failed to operate after WFAA-TV, Dallas began DTV broadcasting on the same channel. Several nearby hospitals experienced data loss in remote cardiac monitoring equipment. This event served as a wake-up call for the entire broadcast industry, as well as secondary and unlicensed users of broadcast spectrum to the potential of DTV interference.

Test Methodology

The study was conducted in two phases: Laboratory testing and a desired-to-undesired (D/U) ratio analysis/modeling. The laboratory tests were conducted using the digital radio testing laboratory at NASA's Lewis Research Center in Cleveland, OH. The Consumer Electronics Manufacturer's Association (CEMA) provided the space and test equipment for the laboratory.

Thomas B. Keller, President of T. Keller Corporation, served as senior consultant on the laboratory phase. He was assisted by David M. Londa, RF Test Manager, NASA Lewis Research Center and Robert W. McCutcheon, Test Engineer.

During the laboratory phase, signal to noise measurements were made with 6 FM radio receivers and up to 3 FM subcarrier receivers while increasing the undesired signal level (DTV) in 5 dB steps. The measurements were repeated for five different undesired DTV transmitter emission models, two desired signal levels and various desired signal center frequencies.

The receiver noise floors were recorded for two multipath scenarios, three desired signal center frequencies and three out of band emission types. All of the laboratory measurements appear in the attached laboratory test report shown in Section II. The measurements contained in the laboratory report can be used to calculate protection ratios and predict FM station coverage based on various undesired signal emissions and desired signal center frequencies.

William F. Hammett, P.E., and Stanley Salek, P.E., of Hammett & Edison, Inc., Consulting Engineers, handled the second phase of the study. They converted the D/U ratio laboratory data into "real world" conditions using computer modeling techniques.

At the request of NPR, Hammett & Edison made certain assumptions in converting the D/U ratio data from the laboratory work into "real world" analysis as follows:

1. That WPVI-TV, NTSC Channel 6 Philadelphia might find it desirable to remain as WPVI-"DTV" Channel 6 at the conclusion of the NTSC/DTV transition period. NPR believes that this is likely since the allotment changes expanded the core DTV channels to include low band VHF frequencies (channels 2 through 6), and, WPVI-TV was assigned DTV Channel 64 which is outside the final core DTV spectrum range, channels 2 through 51. NPR surmises that other television stations may wish to operate as DTV Channel 6 stations, preferring use of DTV Channel 6 where available over higher UHF DTV allotments. Like WPVI-TV, other television stations also received DTV allotments at high UHF channels that are now outside the final core DTV channel range.¹
2. All transmitting and receiving antennas were considered to be horizontally polarized.
3. A typical elevation plane was used to replicate the elevation plane characteristics that would be deployed by a DTV facility.

¹There are 190 television stations assigned to DTV Channel 52 or higher. Twelve of those stations presently occupy NTSC Channel 6 facilities.

WCTV-DT, D52, Thomasville, GA	KWQC-DT, D56, Davenport, IA
KVIE-DT, D53, Sacramento, CA	WCML-DT, D57, Alpena, MI
WABG-DT, D54, Greenwood, MS	KSRE-DT, D57, Minot, ND
WECT-DT, D54, Wilmington, NC	WKMG-DT, D58, Orlando, FL
WIPR-DT, D55, San Juan, PR	WLNS-DT, D59, Lansing, MI
KOTV-DT, D55, Tulsa, OK	WPVI-DT, D64, Philadelphia

Test Findings

The testing confirms that there will be interference between DTV Channel 6 stations and NCE-FM stations when their signal contours overlap. In the markets selected for modeling in this study, there will be significant interference to FM reception coverage in addition to the limitations that might be expected due to terrain factors.

The color maps shown in Section I show Terrain Integrated Rough Earth Models (TIREM) for New Haven and Philadelphia. The TIREM-computed D/U ratios treat the FM stations as the desired station and the DTV as the interfering station. In each market modeled, the DTV signal presence causes interference to the FM signal affecting in well populated portions of the FM listening area.

NPR believes that the study results fully justify its position that DTV Channel 6 allotments are not in the best interest of NPR member stations and its listening public. This study will be used to support that position as the FCC proceeds to implement its report and orders in the advanced television proceeding. In addition, NPR intends to share the results of this study with potentially affected stations.



1

Report on:

**DTV Channel 6 Interference
to FM Band Reception**

Laboratory Test Report

Section I

**Published by:
National Public Radio**

Consultants
Hammett & Edison, Inc.
Consulting Engineers

DTV Channel 6 to FM D/U Ratio Study

New Haven, Connecticut Area Study
Station List and Technical Parameters

Channel 6 DTV Station

WBNE-DT, New Haven, Connecticut

1.0 kW ERP, as allotted by FCC

FCC Replication azimuth pattern, elevation pattern of Figure 2

Radiation center 314 meters HAAT, FCC allotment site.

FM Stations*

WNHU(FM), 88.7 MHz, West Haven, Connecticut

1.7 kW ERP, 49 meters HAAT, nondirectional (as permitted)

D/U Ratios; -27, -14, and 0 dB

WPKN, 89.5 MHz, Bridgeport, Connecticut

10 kW ERP, 169 meters HAAT, directional (as licensed)

D/U Ratios; -27, -23, and -3 dB

WPKT, 90.5 MHz, Meridan, Connecticut

18.5 kW ERP, 251 meters HAAT, directional (as licensed)

D/U Ratios; -36 and -8 dB

* Directional transmitting antenna azimuth pattern, if any, taken from FCC database. Unity elevation pattern assumed.
FCC-authorized transmitting locations.



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DTV Channel 6 to FM D/U Ratio Study

**Philadelphia, Pennsylvania Area Study
Station List and Technical Parameters**

Channel 6 DTV Station

WPVI-DT6 (assumed Channel 6 operation), Philadelphia, Pennsylvania
8.77 kW ERP (FCC maximum for assumed height)
Nondirectional azimuth pattern, elevation pattern of Figure 2
Radiation center 332 meters HAAT, FCC DTV application site.

FM Stations*

WPEB(FM), 88.1 MHz, Philadelphia, Pennsylvania
1 watt ERP, 60 meters HAAT, nondirectional (as permitted)
D/U Ratios: -14, -3, and +3 dB

WXPN(FM), 88.5 MHz, Philadelphia, Pennsylvania
5 kW ERP, 280 meters HAAT, nondirectional (as licensed)
D/U Ratios: -26, -7, and +1 dB

WBYO(FM), 88.7 MHz, Sellersville, Pennsylvania
0.9 kW ERP, 133 meters HAAT, directional (as licensed)
D/U Ratios: -27, -11, and 0 dB

WYBF(FM), 89.1 MHz, Radnor Township, Pennsylvania
0.7 kW ERP, 68 meters HAAT, directional (as licensed)
D/U Ratios: -27, -18, and -2 dB

WSJI(FM), 89.5 MHz, Cherry Hill, New Jersey
2 kW ERP, 55 meters HAAT, directional (as licensed)
D/U Ratios: -28, -23, and -3 dB

WRTI(FM), 90.1 MHz, Philadelphia, Pennsylvania
12.5 kW ERP, 308 meters HAAT, directional (as licensed)
D/U Ratios: -31 and -6 dB

WHYY-FM, 90.9 MHz, Philadelphia, Pennsylvania
13.5 kW ERP, 280 meters HAAT, nondirectional (as licensed)
D/U Ratios: -42 and -9 dB

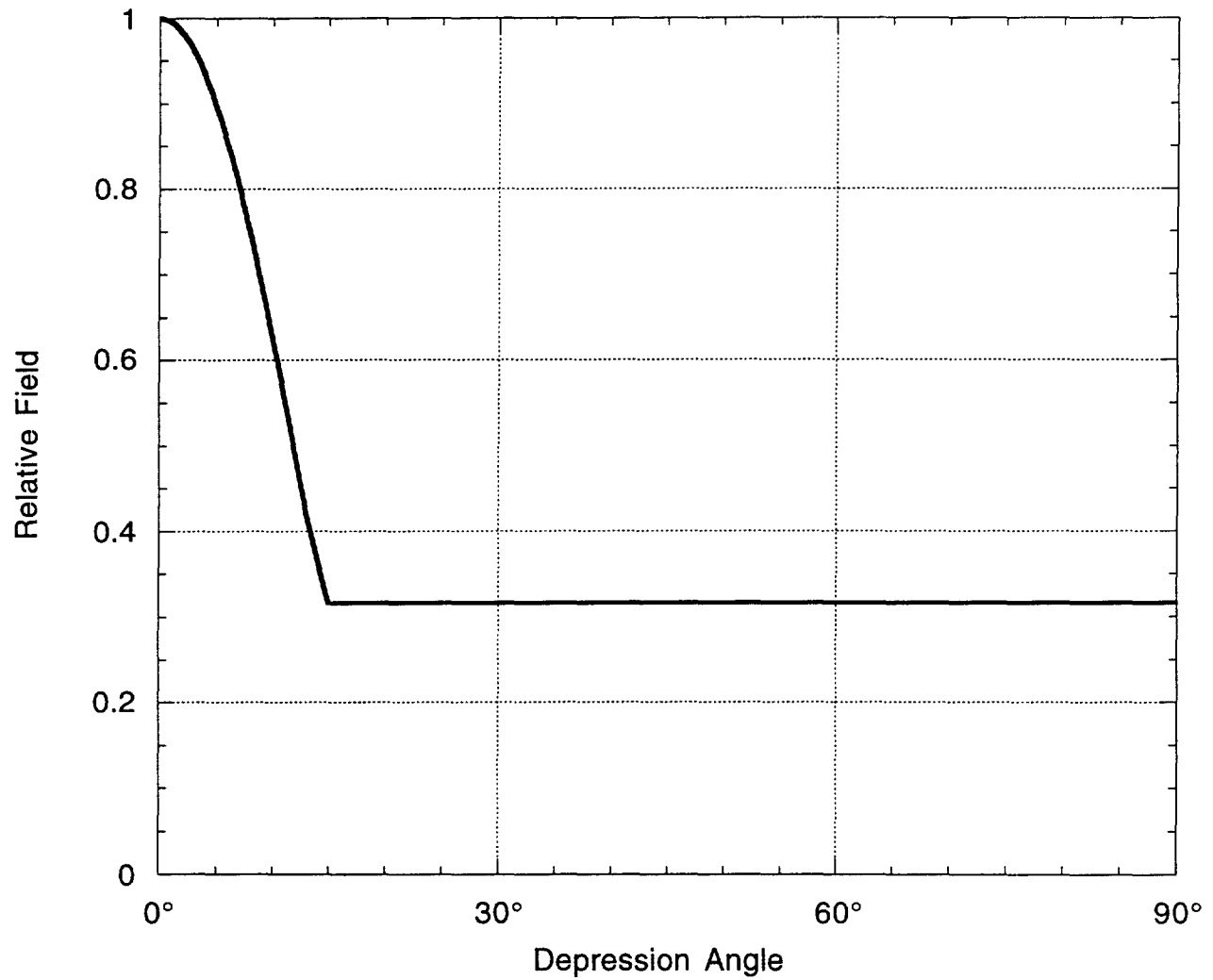
* Directional transmitting antenna azimuth pattern, if any, taken from FCC database. Unity elevation pattern assumed. FCC-authorized transmitting locations. See letter text for WBYO and WYBF polarization assumptions.



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DTV Channel 6 to FM D/U Ratio Study

Assumed DTV Transmitting Antenna
Elevation Pattern



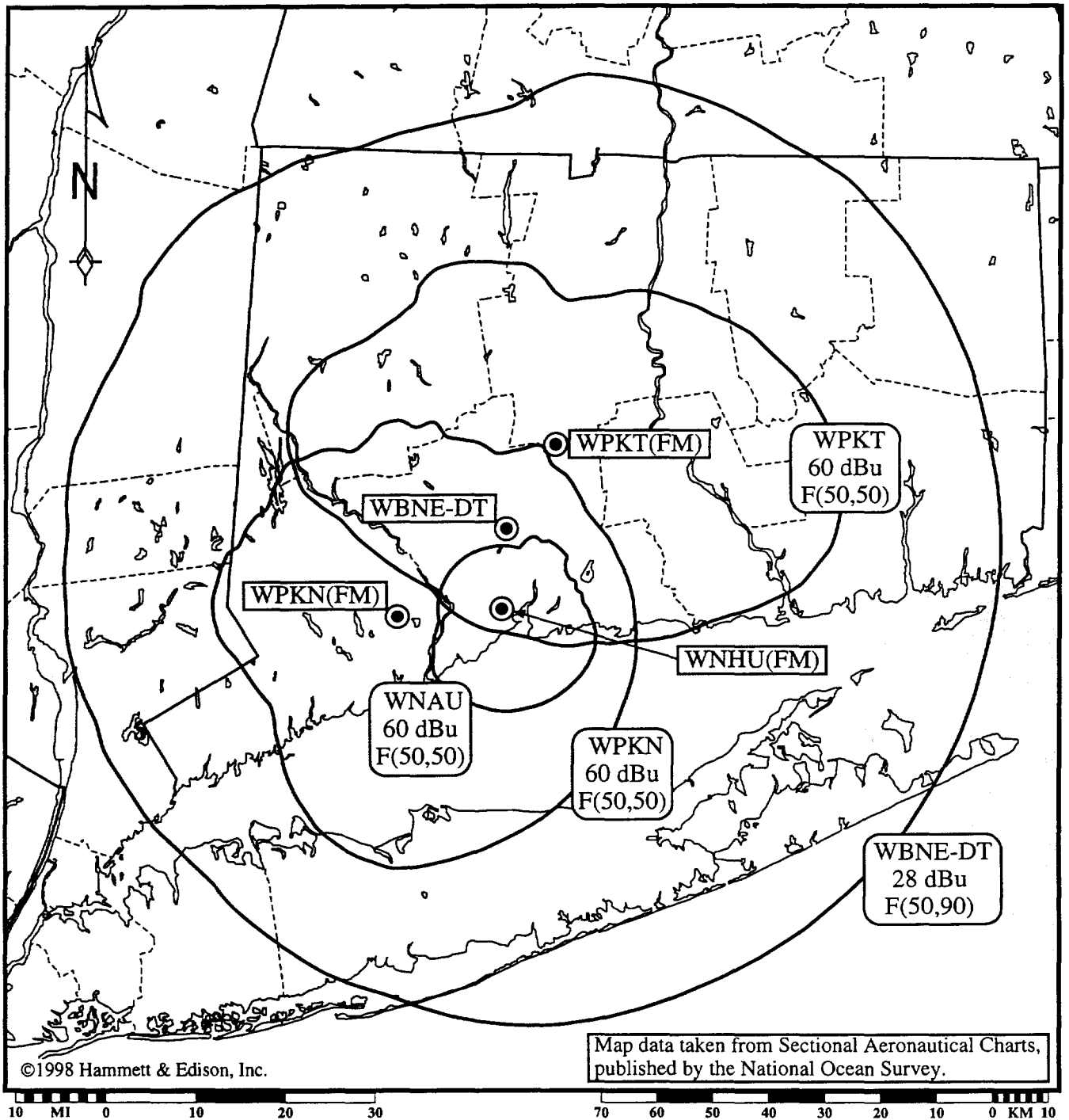
HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

980626
Figure 2

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DTV Channel 6 to FM D/U Ratio Study

New Haven, Connecticut Area Study
Station Locations and FCC Contours



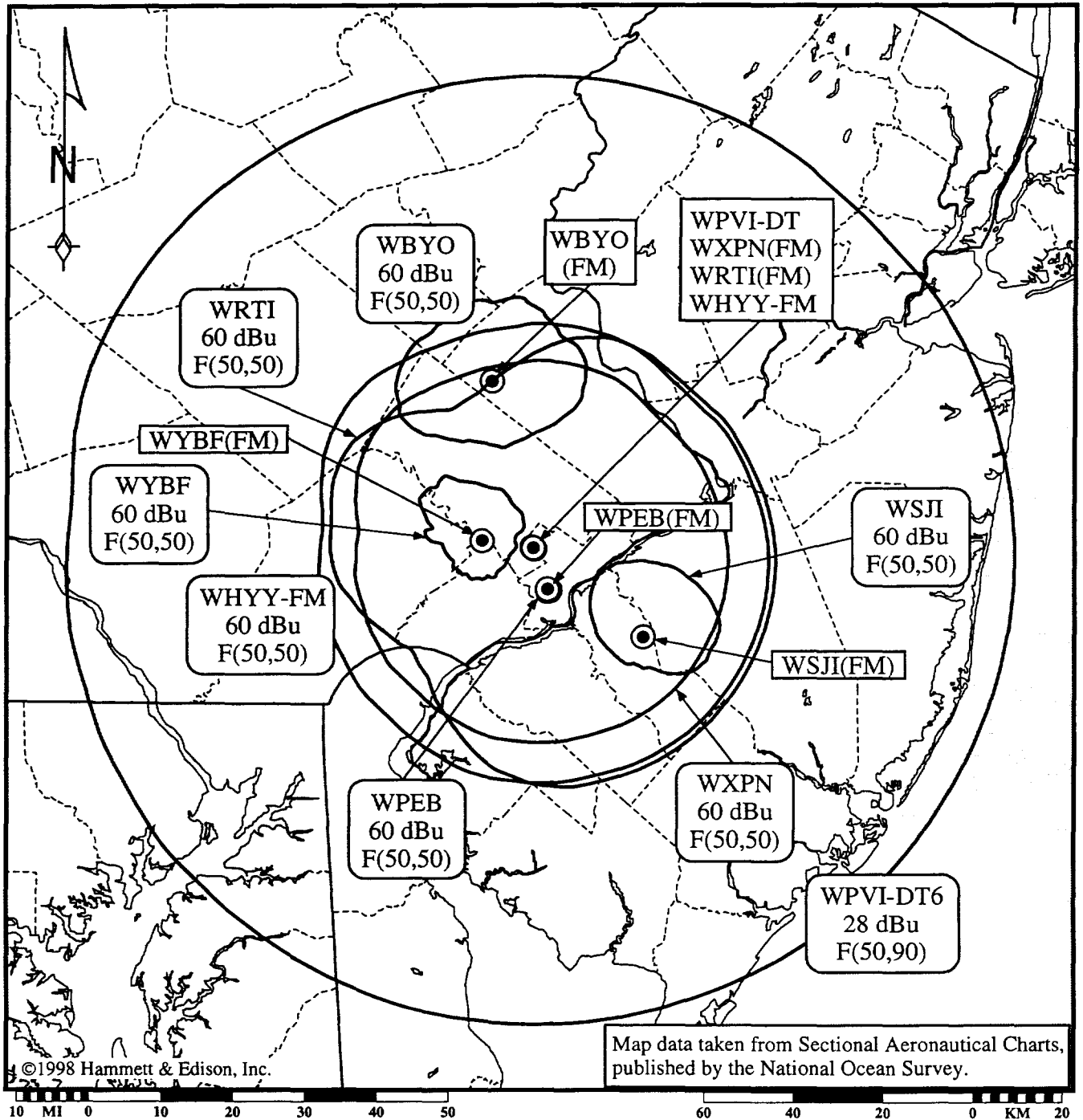
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Figure 3A

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DTV Channel 6 to FM D/U Ratio Study

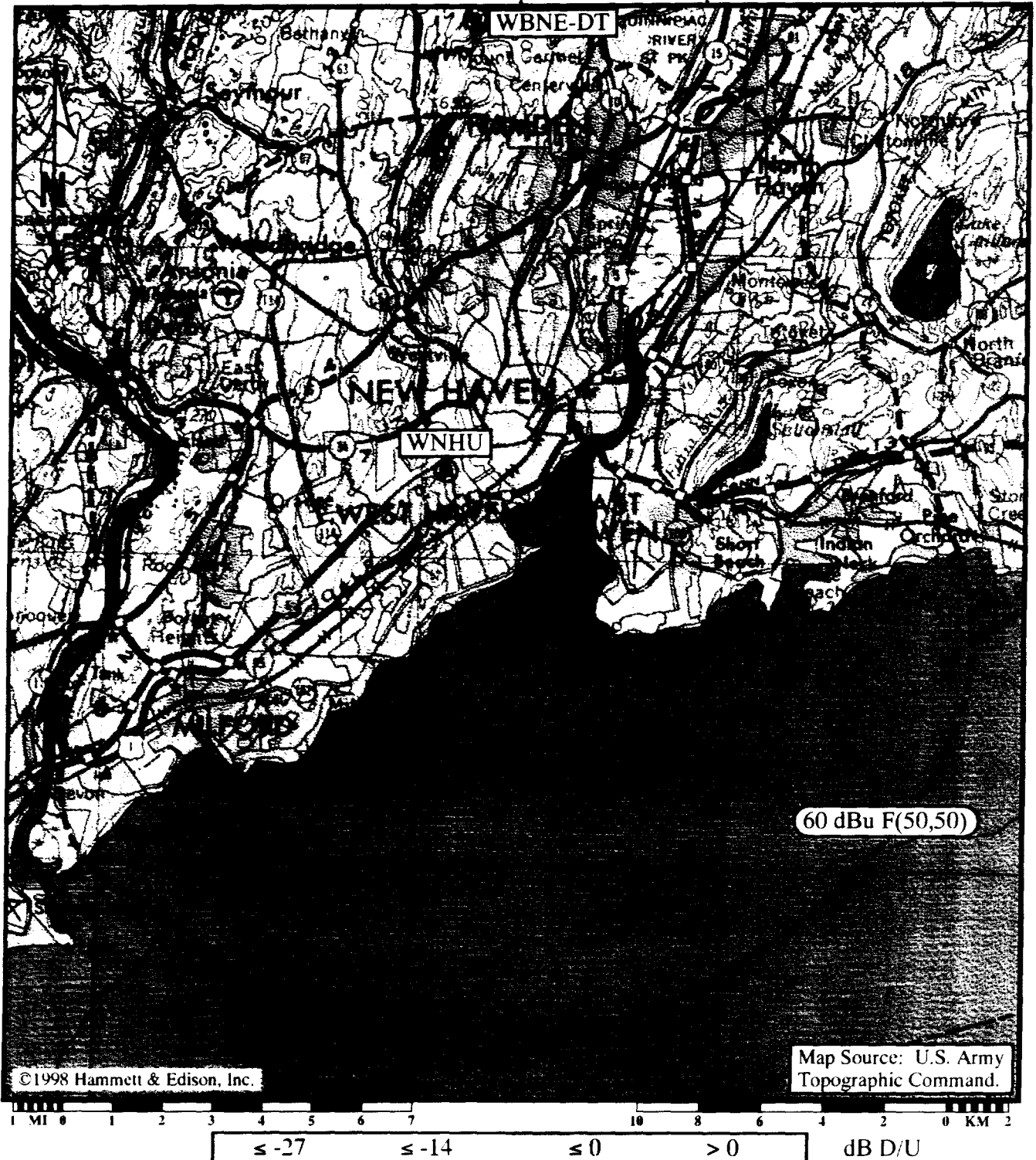
Philadelphia, Pennsylvania Area Study
Station Locations and FCC Contours



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Figure 3B

DTV Channel 6 to FM D/U Ratio Study
 FM Station WNHU, 88.7 MHz, West Haven, Connecticut
 versus Allotted Station WBNE-DT, New Haven, Connecticut
 WNHU FCC 60 dBu Population: 393,480 persons

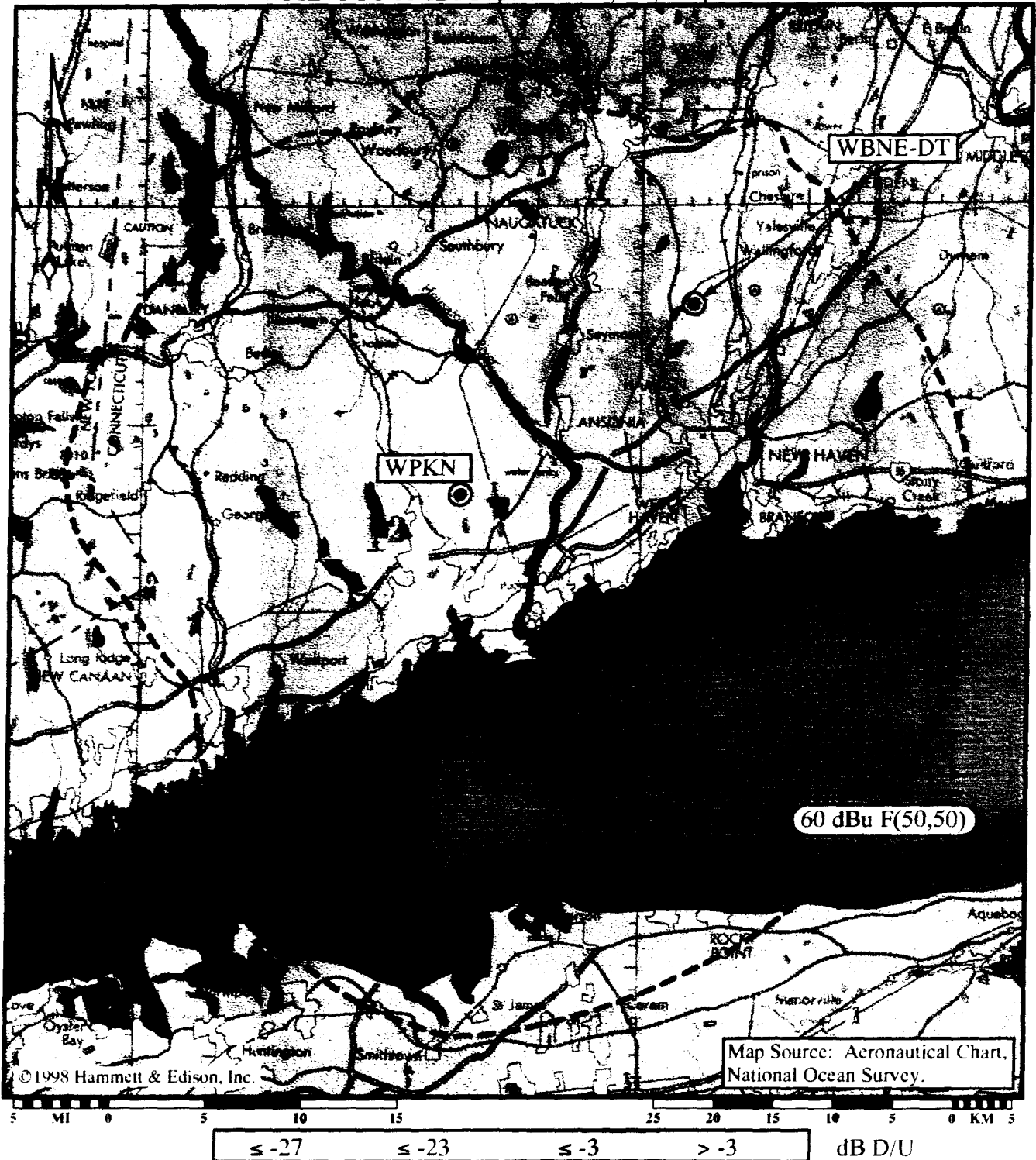


1990 U.S. Census	65	9,834	94,877	(or below threshold)
	0.02	2.50	24.1	persons (within 60 dBu)
	2,170	17,513	128,261	% (of 60 dBu population)
				persons (entire area shown)



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DTV Channel 6 to FM D/U Ratio Study
 FM Station WPKN, 89.5 MHz, Bridgeport, Connecticut
 versus Allotted Station WBNE-DT, New Haven, Connecticut
 WPKN FCC 60 dBu Population: 1,467,683 persons



1990 U.S. Census	9,457	19,872	259,301	(or below threshold)
	0.64	1.35	17.7	persons (within 60 dBu)
	9,457	19,872	300,492	% (of 60 dBu population)
				persons (entire area shown)

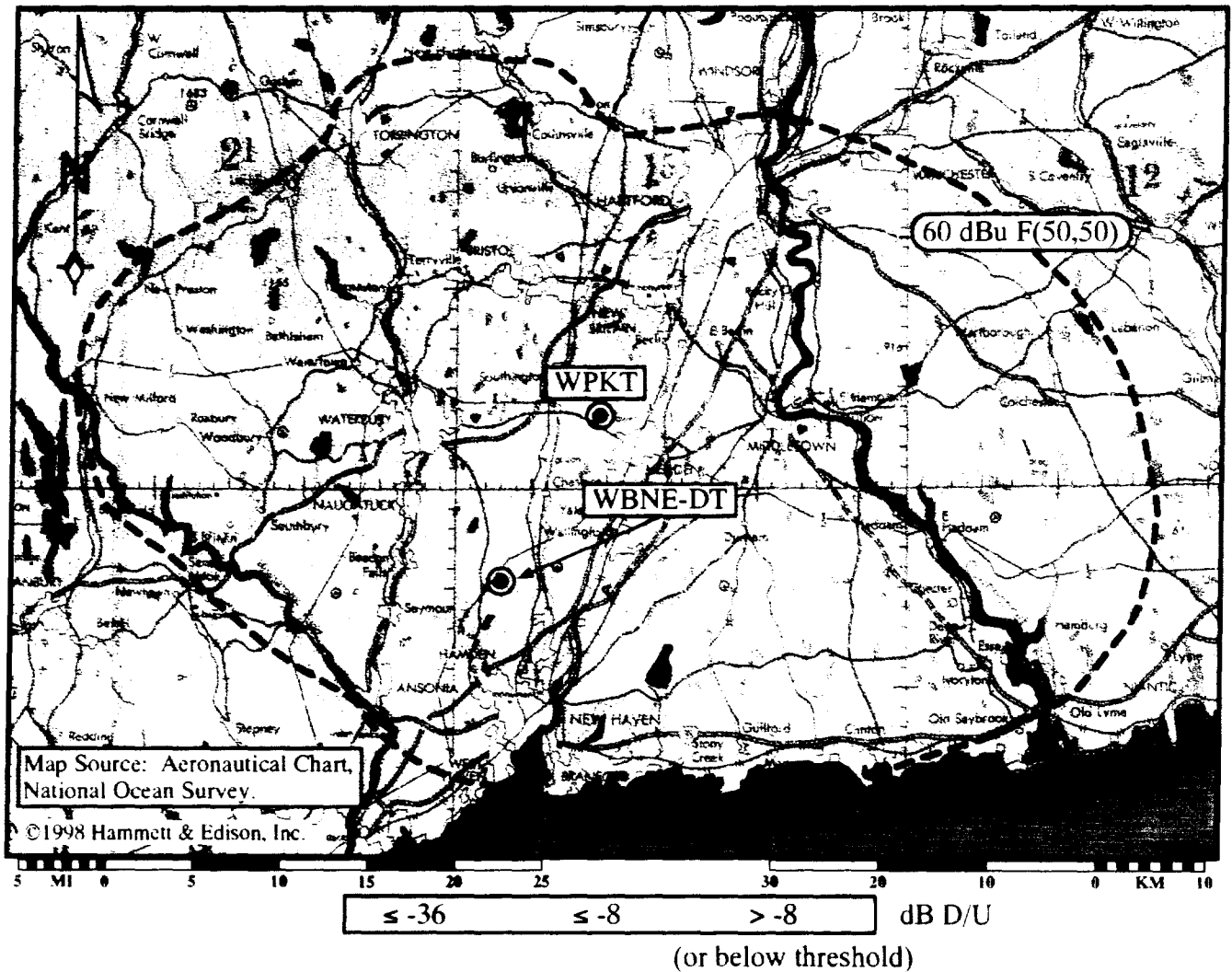


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DTV Channel 6 to FM D/U Ratio Study
FM Station WPKT, 90.5 MHz, Meriden, Connecticut
versus Allotted Station WBNE-DT, New Haven, Connecticut

WPKT FCC 60 dBu Population: 1,683,668 persons



1990 U.S. Census	801	268,376	persons (within 60 dBu)
	0.05	15.9	% (of 60 dBu population)
	801	279,529	persons (entire area shown)

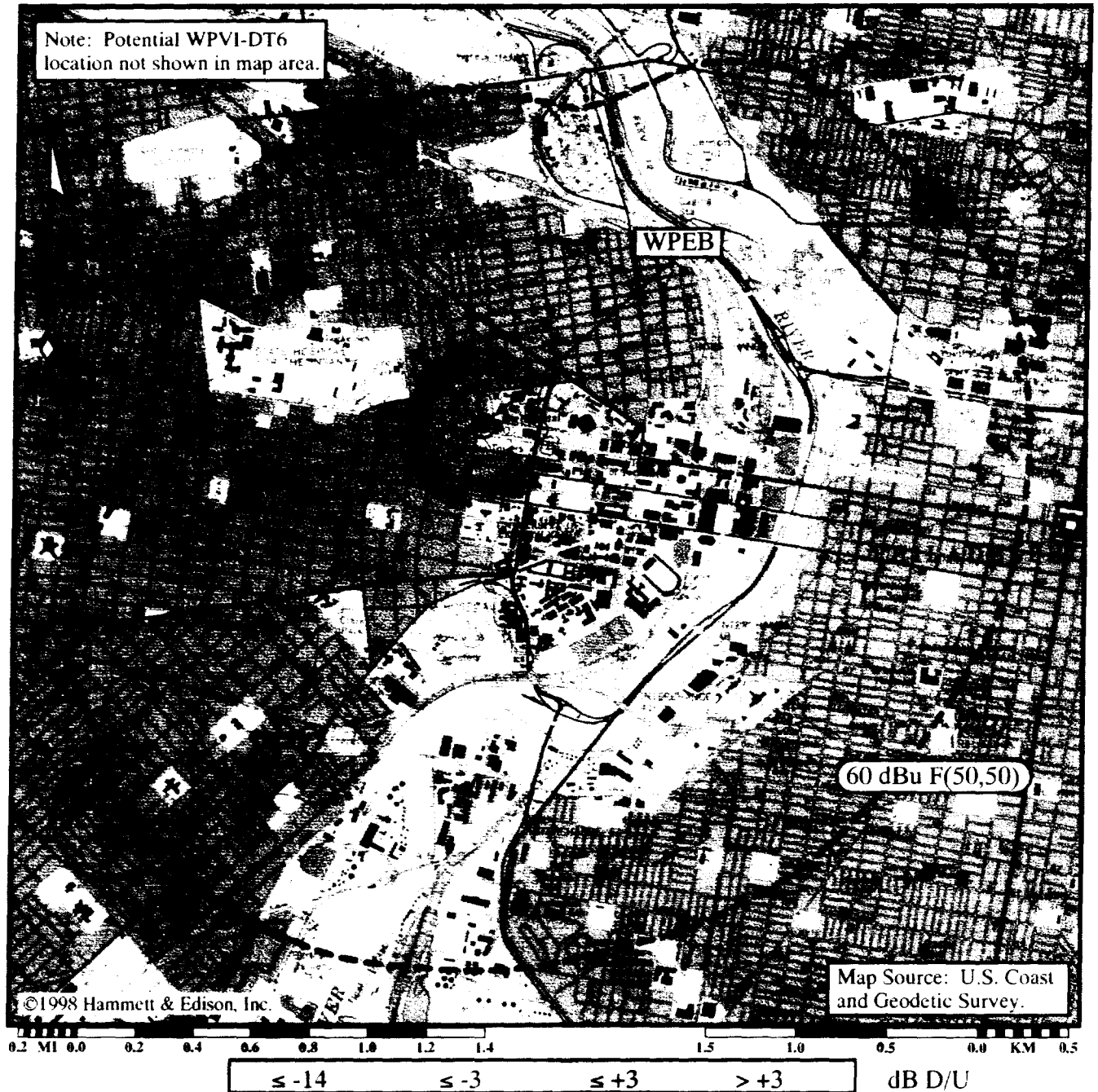


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Figure 4A3

DTV Channel 6 to FM D/U Ratio Study
FM Station WPEB, 88.1 MHz, Philadelphia, Pennsylvania
versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

WPEB FCC 60 dBu Population: 148,586 persons

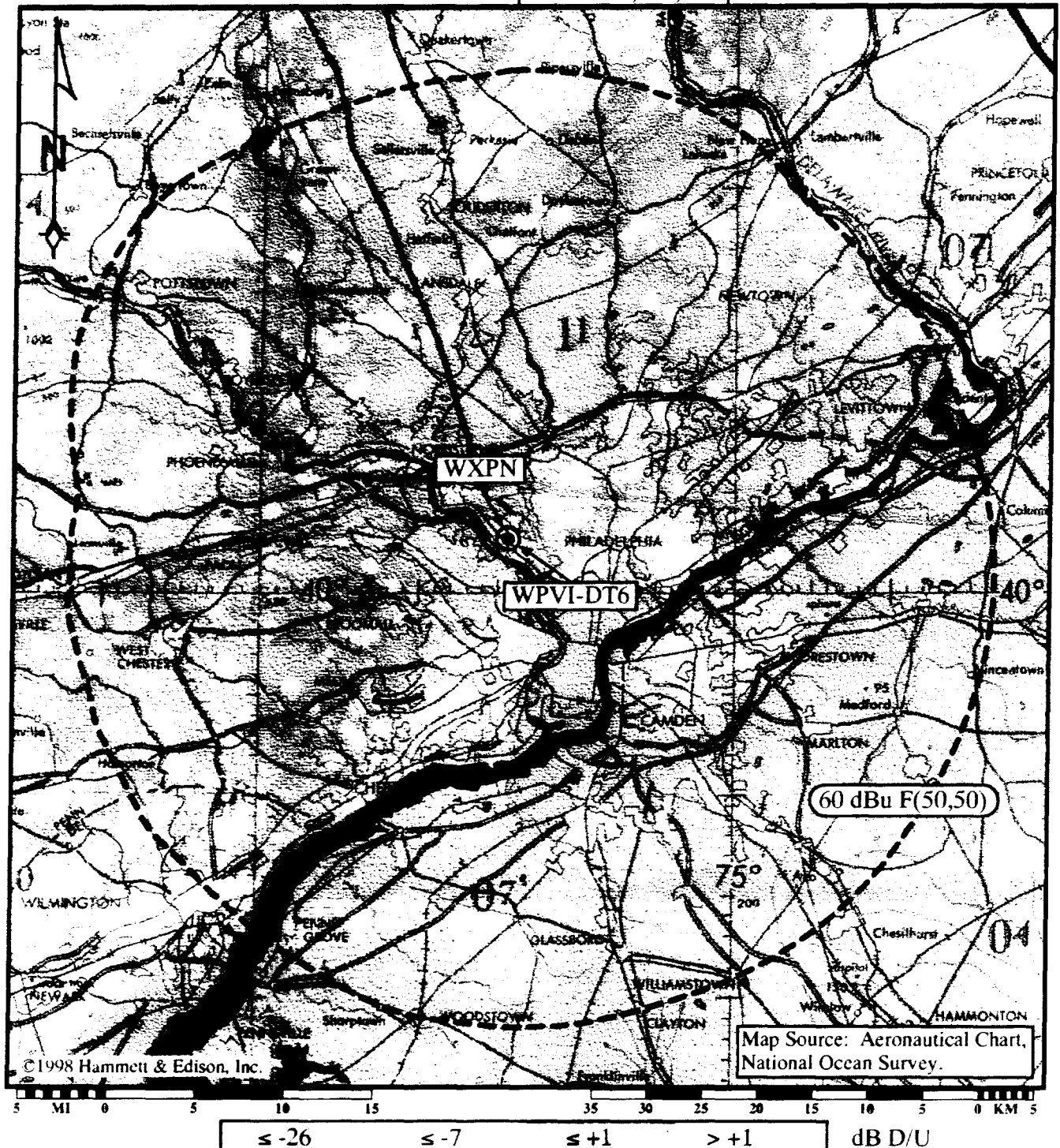


1990 U.S. Census	109,383	142,934	146,341	(or below threshold)
	73.6	96.2	98.5	persons (within 60 dBu)
	223,947	257,498	260,905	% (of 60 dBu population)
				persons (entire area shown)

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DTV Channel 6 to FM D/U Ratio Study
FM Station WXPB, 88.5 MHz, Philadelphia, Pennsylvania
versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

WXPB FCC 60 dBu Population: 4,601,576 persons



1990 U.S. Census

0	132,948	4,494,649
0	2.89	97.7
0	165,020	5,048,561

persons (within 60 dBu)
% (of 60 dBu population)
persons (entire area shown)



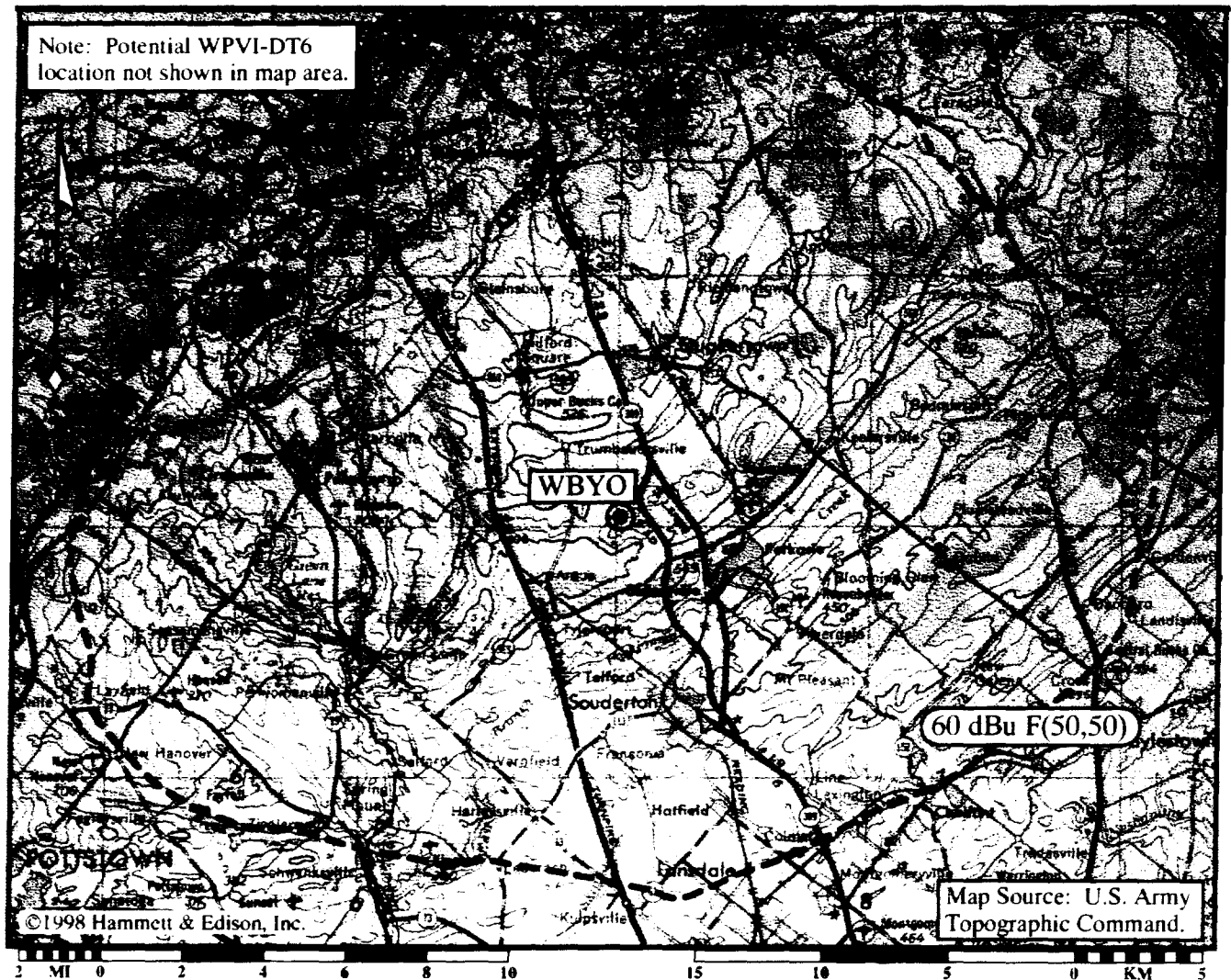
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Figure 4B2

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DTV Channel 6 to FM D/U Ratio Study
FM Station WBYO, 88.7 MHz, Sellersville, Pennsylvania
versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

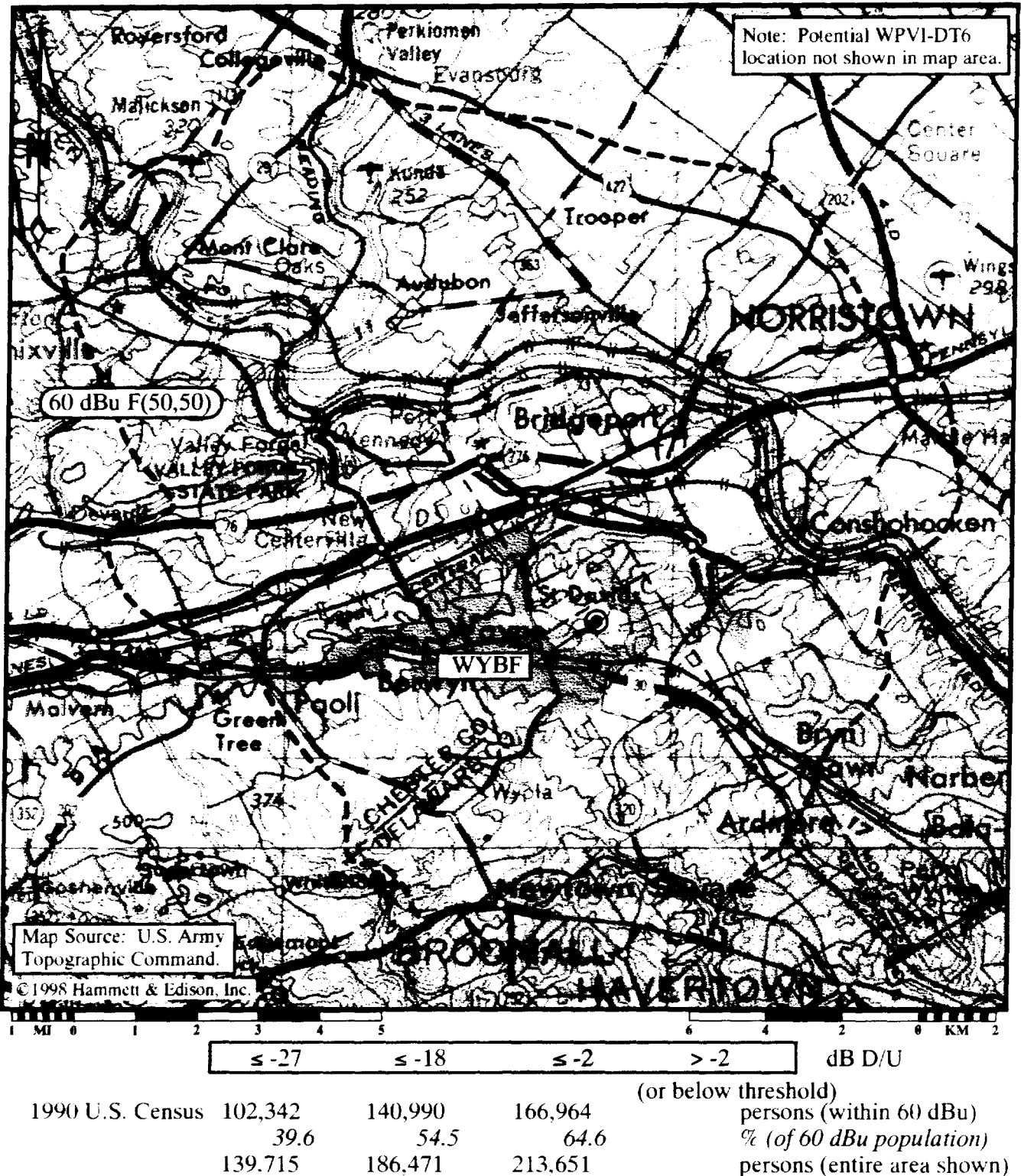
WBYO FCC 60 dBu Population: 181,502 persons



	≤ -27	≤ -11	≤ 0	> 0	dB D/U
					(or below threshold)
1990 U.S. Census	1,412	46,243	66,245		persons (within 60 dBu)
	0.78	25.5	36.5		% (of 60 dBu population)
	15,049	75,830	110,124		persons (entire area shown)

DTV Channel 6 to FM D/U Ratio Study
FM Station WYBF, 89.1 MHz, Radnor Township, Pennsylvania
versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

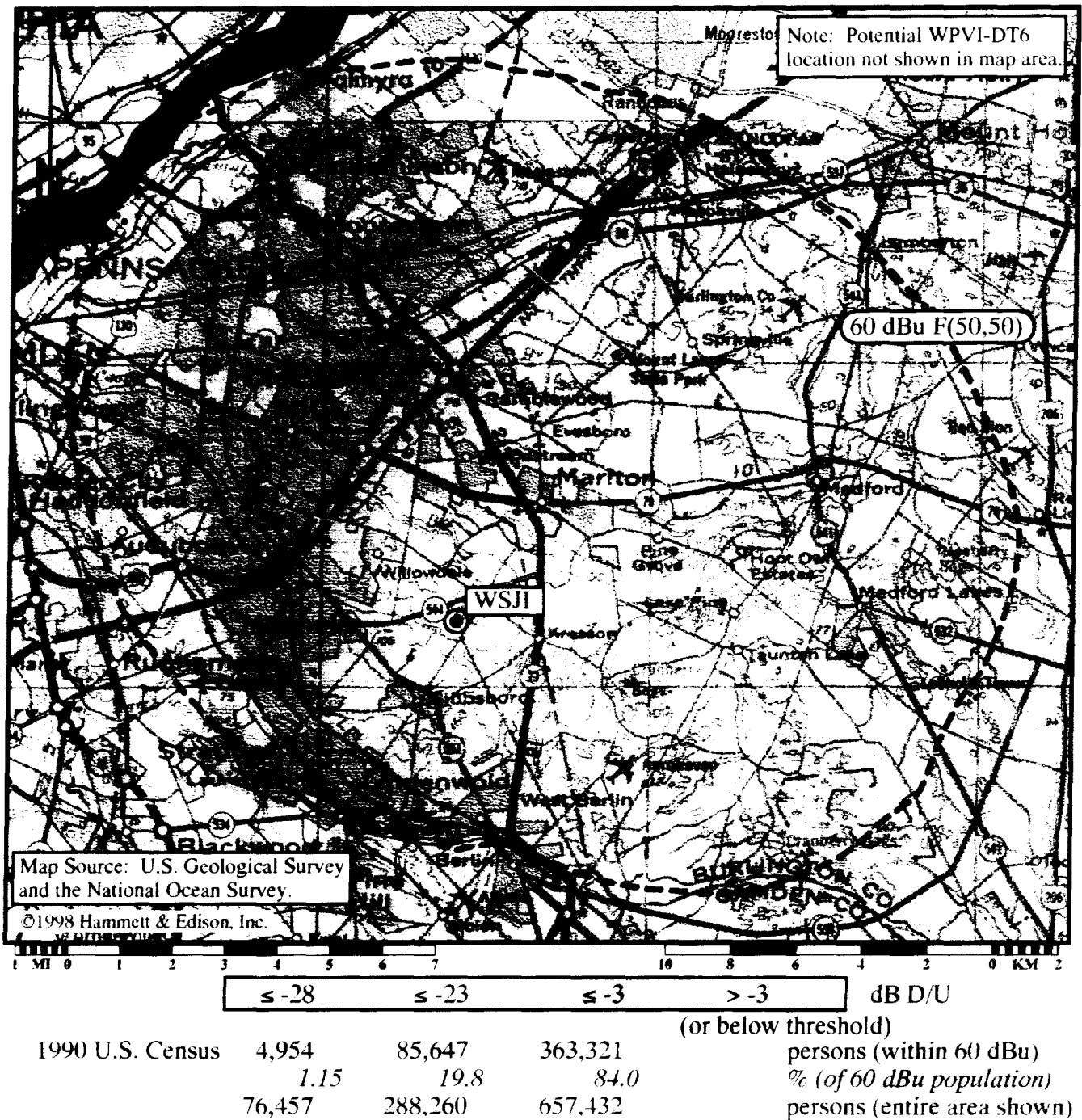
WYBF FCC 60 dBu Population: 258,525 persons



National Public Radio • Washington, D.C.

DTV Channel 6 to FM D/U Ratio Study
 FM Station WSJI, 89.5 MHz, Cherry Hill, New Jersey
 versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

WSJI FCC 60 dBu Population: 432,508 persons



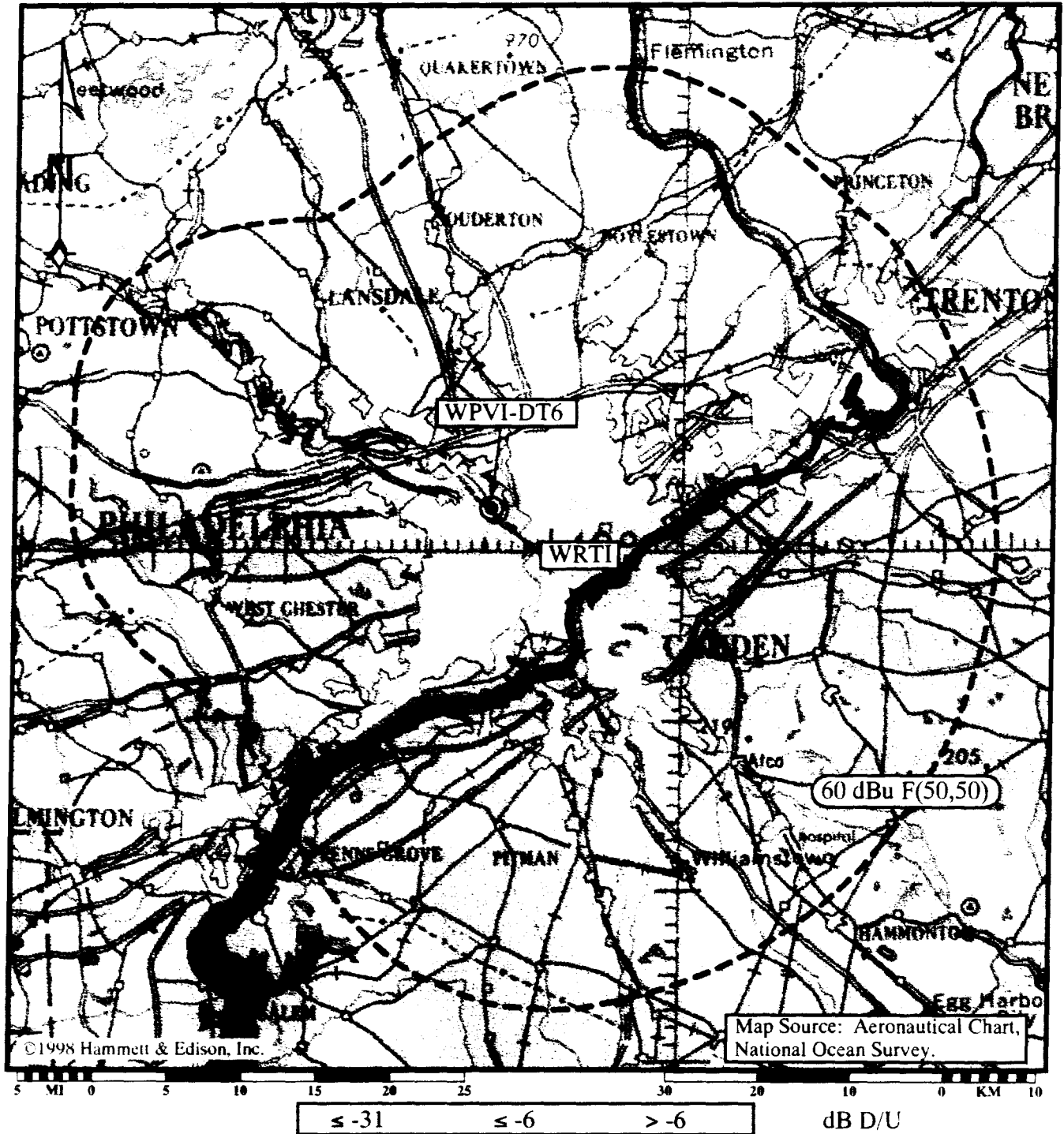
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 Figure 4B5

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DTV Channel 6 to FM D/U Ratio Study
FM Station WRTI, 90.1 MHz, Philadelphia, Pennsylvania
versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

WRTI FCC 60 dBu Population: 4,942,289 persons



1990 U.S. Census

0 257,317
0.02 5.21
0 306,890

(or below threshold)

persons (within 60 dBu)
% (of 60 dBu population)
persons (entire area shown)



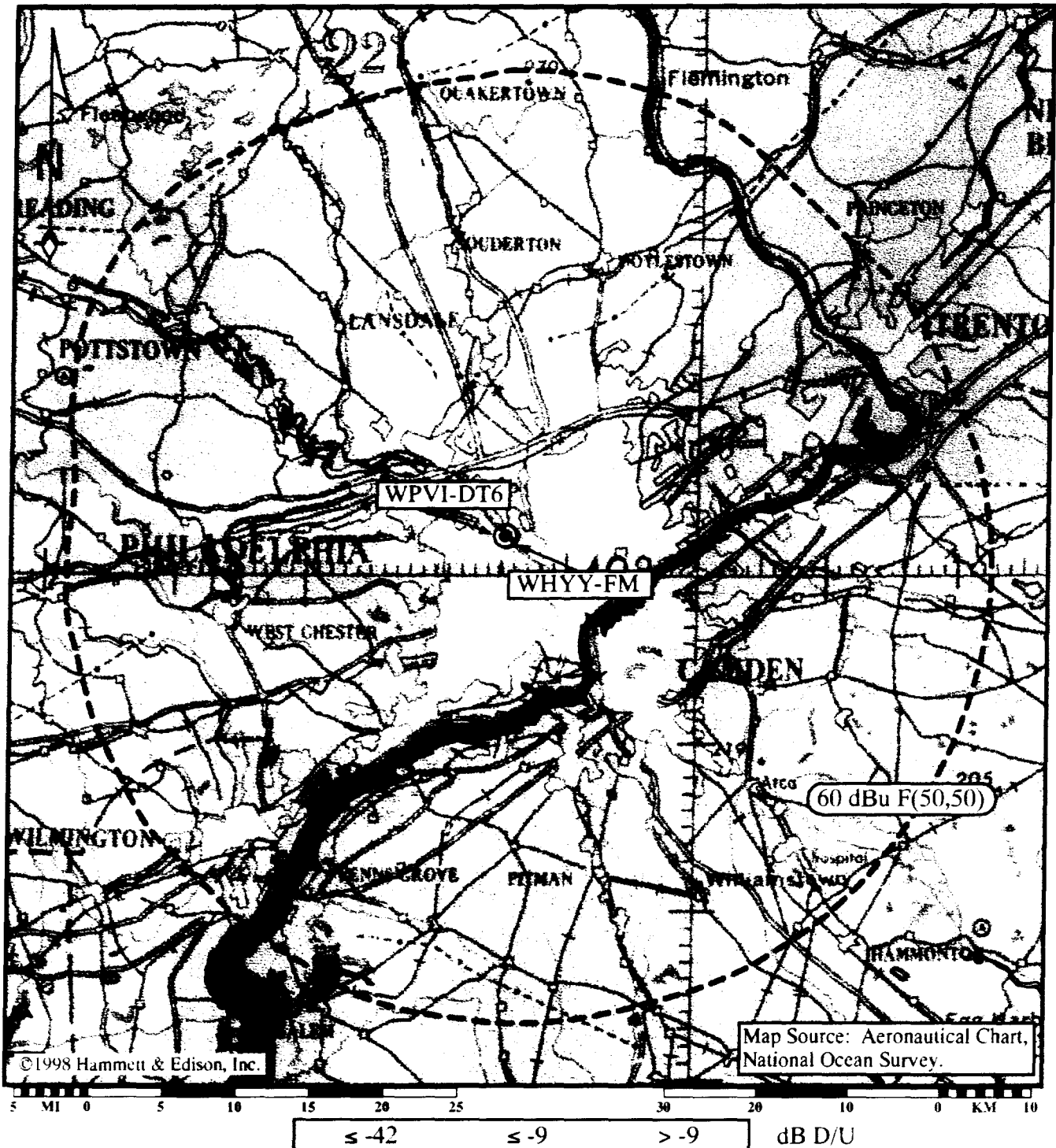
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Figure 4B6

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DTV Channel 6 to FM D/U Ratio Study
FM Station WHYY-FM, 90.9 MHz, Philadelphia, Pennsylvania
versus Potential Station WPVI-DT6, Philadelphia, Pennsylvania

WHYY FCC 60 dBu Population: 5,228,149 persons



1990 U.S. Census

0	34,928
0	0.67
0	35,400

persons (within 60 dBu)
% (of 60 dBu population)
persons (entire area shown)



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Figure 4B7

About The Accompanying Maps

The coverage of FM and TV stations is greatly affected by the nature of the terrain in which the stations are located. In flat or gently rolling country, coverage extends approximately the same distance in all directions and is controlled mainly by the power radiated and the height of the transmitting antenna. In such smooth terrain, the simple method of predicting coverage used by the FCC for over forty years provides useful and reasonably accurate maps of coverage. However, for stations located in rough terrain, the FCC-style maps fail to provide a meaningful measure of TV coverage.

To prepare coverage maps that realistically predict coverage, Hammett & Edison, Inc. developed a complete system to determine and show the actual effects of terrain on coverage. This system uses the sophisticated propagation algorithm called the Terrain Integrated Rough Earth Model (TIREM), developed at the Joint Spectrum Center (JSC, formerly ECAC) in Annapolis, Maryland. TIREM uses detailed terrain profiles to compute values of basic transmission loss from point to point. The model evaluates the profile between two sites and, based on the geometry of the profile, selects automatically the most probable mode of propagation from various knife-edge models, a rough-earth diffraction model, and line-of-sight models. When combined with the United States Geological Survey (USGS) 3-second terrain database, as has been done, the TIREM model is the most accurate available means of predicting signal strength when details of terrain along the propagation path are known.

The maps presented here, in a style first copyrighted by Hammett & Edison in 1989, show TIREM-computed desired-to-undesired (D/U) ratios for the predicted effect on FM station coverage, for FM stations in the 88.1 to 90.9 MHz range, from potential interference by a digital television (DTV) station operating on TV Channel 6 (82-88 MHz). In all cases, the FM station is treated as the desired station, so negative D/U ratios indicate areas for higher DTV station signal strengths. An FM threshold of 48 dBu was selected, under which no D/U ratios were computed. A 3-meter receiving antenna height was assumed for all cases. All D/U ratio threshold figures are as provided to Hammett & Edison by National Public Radio, as based on previously conducted laboratory studies commissioned by NPR.

The color contours shown on the attached maps represent D/U regions as defined by the scale at the bottom of each map. For comparison, the 60 dBu F(50,50) contour of each FM station, as plotted in accordance with FCC procedures, is included on each map. Population figures, as based on the 1990 U.S. Census, also are shown at the bottom, for population contained both within the defined D/U region and within the FCC 60 dBu contour, as well as for the entire map area shown. Percentage of FCC 60 dBu contour population coverage is also shown for each D/U region.



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